

Inequity of use of implantable cardioverter defibrillators in England: retrospective analysis

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Sudden cardiac death occurs in approximately 100 000 people annually in the United Kingdom and can be prevented by implantable cardioverter defibrillators (ICDs).¹ Rates of implantation of ICDs in England have been increasing but lag behind those in other western European countries and North America. The National Institute for Clinical Excellence has recommended indications for use in patients with ventricular arrhythmias and proposed an annual implantation rate of 50 per million population.² We present data on current use, geographical and social equity, and barriers to care in the provision of ICDs in England.

Methods and results

We used the national pacemaker and ICD database of implantations done in 1998-2002 to derive national rates. We used a dataset from 1998 to 2000, in which improvements in the quality and completeness of data had been made, to derive rates of implantation of new ICDs by English health region. We calculated indirect age and sex standardised ratios of ICD use by health region by using regional population data divided into five year age bands (0 to 85+ years). We assessed equity by using proxy measures for need for ICDs—namely, regional standardised mortality ratios for ischaemic heart disease—and population fifths of deprivation determined using the Townsend index at census ward level and 1991 census data. We did a national postal questionnaire survey of all recorded ICD centres in England to establish perceived barriers to implantation.

The crude rate of implantation of new ICDs in England rose from 12.4 (95% confidence interval 11.5 to 13.5) per million in 1998 to 30 (28.7 to 31.7) per

million in 2002. Regional standardised ratios of use ranged from 0.6 to 1.25 (figure). Significant regional differences in standardised rates of implantation existed (χ^2 for heterogeneity, $P=0.005$), although we found no consistent geographical pattern. Differences between implantation and need in five out of eight regions (95% confidence intervals for standardised ICD implantation and standardised mortality ratio for ischaemic heart disease did not overlap) suggested inequity. A significant inverse relation existed between standardised ICD implantation and fifths of deprivation ($P=0.005$, test for trend using a Poisson regression model), ranging from 1.09 to 0.85 (least to most deprived), indicating that an inverse care law may be operating.

The survey response rate was 74% (26/35). The three most commonly perceived barriers to care for patients eligible for an ICD were identification of patients and referral to implanting centres, staff capacity, and funding for treatment. All of the respondents recorded that they expect to see a large increase in demand for ICDs in the future.

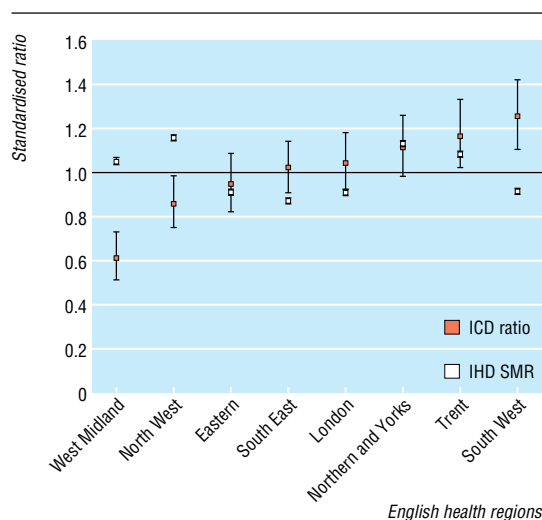
Comment

Use of ICDs varies between English health regions, and use is not commensurate with need. Although incomplete data could be contributing, an inverse care law seems to be operating. This, along with the slow diffusion of the technology and setting of services predominantly in larger tertiary centres, is similar to the pattern previously seen for coronary revascularisation.^{3,4}

Demand for ICDs will probably increase in the future, particularly in view of expanding indications with randomised evidence of the benefits of ICDs in post-myocardial infarction patients with a low left ventricular ejection fraction.⁵ Planned expansion of implanting centres and resources are needed to tackle low levels of referral, geographical and social inequity, and the expected increase in demand for ICDs. Strategies should include referral guidelines and targeted education to ensure appropriate identification and referral of eligible patients. These analyses highlight the value of robust national data to inform service development and the need for adequate resources to collect and analyse such information.

We thank Scot Harris for statistical support and Morag Cunningham, administrator of the national pacemaker and ICD database.

Contributors: JP led the project, cleaned the dataset, did the analyses, constructed the questionnaire and conducted the survey, wrote the first draft of the paper, and is the guarantor. DLC did the analyses, conducted the survey, and helped in writing the paper. AG helped with the survey, commented on drafts, and provided clinical perspective and support to the study. DC is project leader of the national pacemaker and ICD database,



Age and sex standardised ratios of implantable cardioverter defibrillator (ICD) use and standardised mortality ratios for ischaemic heart disease (IHD SMR) in English health regions, 1998-2000

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What is already known on this topic

Implantation of implantable cardioverter defibrillators in England lags behind most western European and North American countries

What this study adds

An inverse care law seems to be operating on implantation of new implantable cardioverter defibrillators in England

Demand for implantable cardioverter defibrillators is likely to increase in the near future, and a pressing need exists to tackle any inequity and perceived barriers to care

provided the 1998-2000 dataset in which data quality and completeness had been improved, and commented on drafts of the paper. PJR oversaw the project, supervised JP and DLC, supplied epidemiology expertise for analyses, and commented on drafts of the paper.

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Competing interests: None declared.

Ethical approval: Not needed for this study, as it used aggregated anonymised data and no patient contact.

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DRUG POINTS

Nausea and vomiting due to insulin glargine in patient with type 1 diabetes mellitus

Anthony N Dixon, Stephen C Bain

Insulin glargine is a new insulin analogue with delayed absorption and a prolonged duration of action.¹ A 34 year old woman who had had type 1 diabetes for six years had previously been treated with premixed biphasic isophane insulin (Humulin M3), twice a day. This regimen had been changed to a basal bolus regimen of Actrapid and Insulatard during pregnancy, but she subsequently resumed twice daily injections (but this time with Mixtard 30). She reported no side effects on any of these preparations. She had no other serious illness and no complications of diabetes.

After a period of suboptimal glycaemic control, she was changed to a basal bolus regimen of Actrapid and insulin glargine. Within 24 hours she complained of nausea. Pregnancy and infection were excluded, but she remained nauseous for six weeks. During this time her glycaemic control improved (her HbA_{1c} concentration decreased from 9.8% to 8.6%), but the nausea began to lead to frequent vomiting, which could not be controlled with antiemetics. Insulin glargine was replaced with Insulatard, and her symptoms settled over two days.

Over the next three months she remained well, but her glycaemic control deteriorated and she requested that she try insulin glargine again. Nausea returned within a few hours and continued for several days until insulin glargine was again withdrawn.

Glargine is usually well tolerated, with side effects limited to irritation at the injection site.² The Committee on Safety of Medicines (via its "yellow card" reporting scheme) has received three other reports of nausea and two of vomiting since the product was launched in the United Kingdom (see www.yellowcard.gov.uk). These side effects are clearly important in type 1 diabetes since they may predispose to diabetic ketoacidosis. Moreover,

prolonged periods of nausea may be erroneously attributed to gastric autonomic neuropathy, leading to unnecessary investigation and treatment.

Contributors: AND wrote the article and SCB treated the patient and edited the text.

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Competing interests: SCB has received funding from Aventis and other insulin manufacturers for attending symposiums, organising educational sessions, and supporting employment of staff.

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Endpiece

God, surgeon, medicine, patient

Hippocrates in his Aphorisms, as Galen writeth sure,
Saith, foure things are needfull to every kind of cure,
The first, saith he, to God belongeth the chieftest part,
The second to the Surgeon, who doth apply the art,
The third unto the medicine, that is dame Natures
friend
The fourth unto the patient, with whom I heere will
end.

Clowes W. *A profitable and necessarie
booke of observations*. London: 1596

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